light receiving portion 20, an amplifier 31, a comparator 35, a signal generation circuit 40, a time measurement circuit 50, and a microcomputer 90. The microcomputer 90 has a combination of an input/output port, a CPU, a RAM, and a ROM. The microcomputer 90 operates in accordance with a program stored in the ROM.

The light emitting portion 10 contains a light emitting element (for example, a laser diode) 11, a laser-diode drive circuit 12, a lens 15, a scanner 16, and a motor drive circuit 18. The scanner 16 has a mirror 16A and a motor (not shown). The mirror 16A is mechanically connected with the output shaft of the motor. The mirror 16A can be rotated by the motor. The motor is electrically connected to the motor drive circuit 18. The motor drive circuit 18 is connected to the microcomputer 90. The laser diode 11 is connected to the laser-diode drive circuit 12. The laser-diode drive circuit 12 is connected to the signal generation circuit 40 and the microcomputer 90.

The laser-diode drive circuit 12 receives a transmission signal from the signal generation circuit 40. The transmission signal has a train of pulses. The laser-diode drive circuit 12 receives a power control signal from the microcomputer 90. The laser-diode drive circuit 12 activates and deactivates the laser diode 11 in response to the transmission signal so that the laser diode 11 emits pulse laser light. Every pulse of the laser light corresponds to a pulse in the transmission signal. The laser-diode drive circuit 12 adjusts the power of the pulse laser light in response to the power control signal. The pulse laser light travels from the laser diode 11 to the

mirror 16A before being reflected thereby. The reflection-resultant pulse laser light propagates through the lens 15, being narrowed and outputted from the light emitting portion 10 as a forward pulse laser beam.

The motor drive circuit 18 receives a motor drive signal from the microcomputer 90. The motor drive circuit 18 activates the motor in response to the motor drive signal so that the motor periodically and cyclically rotates the mirror 16A along clockwise and counterclockwise directions in a predetermined limited angular range. The periodical and cyclical rotation of the mirror 16A causes periodical and cyclical deflection of the forward pulse laser beam, thereby enabling a given angular region in front of the subject vehicle to be periodically scanned by the forward pulse laser beam. The given angular region corresponds to a given sectorial detection area (a given sectorial scanned area) monitored by the apparatus of Fig. 1. The given angular region or the given sectorial detection area extends horizontally with respect to the subject vehicle.

The light receiving portion 20 contains a light receiving element 21 and a lens 25. The light receiving element 21 includes, for example, a photodiode or a photodetector. The light receiving element 21 is connected to the amplifier 31. The amplifier 31 is connected to the comparator 35. The comparator 35 is connected to the time measurement circuit 50 and the microcomputer 90. The time measurement circuit 50 is connected to the signal generation circuit 40 and the microcomputer 90.

In the case where an object exists in the detection area (the

given angular region), the forward pulse laser beam encounters the object before being at least partially reflected thereby. A portion of the reflected pulse laser beam returns to the apparatus of Fig. 1 as an echo pulse laser beam. Specifically, the echo pulse laser beam travels through the lens 25 before being incident to the light receiving element 21. The light receiving element 21 converts the echo pulse laser beam into a corresponding electric signal (referred to as an echo signal). The light receiving element 21 outputs the electric signal to the amplifier 31. The device 31 amplifies the output signal of the light receiving element 21. The amplifier 31 outputs the amplification-resultant signal to the comparator 35. The device 35 compares the output signal of the amplifier 31 with a predetermined reference voltage (a predetermined threshold voltage) Vth for object detection, thereby converting the output signal of the amplifier 31 into a binary decision signal or a pulse decision signal. The binary decision signal is in its high-level state when the voltage of the output signal of the amplifier 31 exceeds the predetermined reference voltage Vth. Otherwise, the binary decision signal is in its low-level state. The binary decision signal in its high-level state represents the reception of an echo from an object. The comparator 31 outputs the binary decision signal (the pulse decision signal) to the time measurement circuit 50 and the microcomputer 90.

During the distance measurement, the microcomputer 90 generates the motor drive signal. The microcomputer 90 outputs the motor drive signal to the motor drive circuit 18. As previously